

What is claimed is:

1. A system for balancing a distribution of allocations for protected software over a communication network according to a license policy, the system comprising:

at least one client computer coupled to the communication network for requesting authorizations to use the protected software; and  
a pool of license servers coupled to the communication network, each license server programmed for managing a distribution of allocations to use the protected software; the pool of license servers including a current leader server programmed for updating the distribution of allocations to add at least one additional allocation to a particular license server if that particular license server did not have a sufficient number of allocations.

2. A system as recited in claim 1, each license server further including a borrowing threshold and programmed for determining whether the particular license server did not have a sufficient number of allocations by dividing an allocations-in-use value for that particular license server by a total allocation value for that particular license server and determining if a quotient of the division is greater than the borrowing threshold.

3. A system as recited in claim 2, the current leader server further programmed for updating the distribution of allocations to add at least one additional allocation to a particular license server if that particular license server did not have a sufficient number of allocations at any time during processing of a request for authorization from a client computer.

4. A system as recited in claim 2, the current leader server further including memory for storing the distribution of allocations for all license servers in the pool.

1           5.     A system as recited in claim 2, wherein if the particular license server  
2 determines that it does not have a sufficient number of allocations at any time during  
3 processing of a request for authorization received from the client computer, the current leader  
4 server is further programmed for:

5                 looking for a source of available allocations by checking a count of available  
6 allocations in a free pool, any down license servers, and the leader server; and

7                 decreasing the count of available allocations from the source of available  
8 allocations and increasing the count of available allocations for the particular license server if  
9 the source of available allocations is found.

10           6.     A system as recited in claim 5, the current leader server further programmed for  
11 communicating the updated distribution of allocations in the pool to all functioning license  
12 servers in the pool that are not the current leader server through a distribution criteria sync  
13 message.

14           7.     A system as recited in claim 4, the current leader server further programmed for  
15 storing a new distribution of allocations in response to a change distribution criteria message  
16 containing the new distribution of allocations communicated to a license server.

17           8.     A system as recited in claim 7:  
18                 the license servers that are not the current leader server further programmed for  
19 communicating the change distribution criteria message to the current leader server if the  
20 license servers that are not the current leader server should receive a change distribution  
21 criteria message; and  
22                 the current leader server further programmed for communicating the new  
23 distribution of allocations in the pool to all functioning license servers in the pool that are not  
24 the leader server through a distribution criteria sync message.

1           9.     A system as recited in claim 4, the current leader server further programmed for  
2 adding allocations to the pool in response to an add allocations message containing a count of  
3 allocations to be added to particular protected software communicated to a license server.

1           10.    A system as recited in claim 9:  
2                the license servers that are not the current leader server further programmed for  
3 communicating the add allocations message to the current leader server if the license servers  
4 that are not the current leader server should receive an add allocations message; and  
5                the current leader server further programmed for communicating an updated  
6 distribution of allocations in the pool to all functioning license servers in the pool that are not  
7 the leader server through a distribution criteria sync message.

1           11.    A system as recited in claim 4, the current leader server further programmed for  
2 adding a new license code to the pool in response to an add license code message containing a  
3 license code to be added communicated to a license server.

1           12.    A system as recited in claim 11:  
2                the license servers that are not the current leader server further programmed for  
3 communicating the add license code message to the current leader server if the license servers  
4 that are not the current leader server should receive an add license code message; and  
5                the current leader server further programmed for communicating an updated  
6 distribution table containing the stored license codes and corresponding distribution of  
7 allocations in the pool to all functioning license servers in the pool that are not the leader  
8 server through a distribution criteria sync message.

1           13.    A system as recited in claim 4, the current leader server further programmed for  
2 updating the distribution of allocations to add at least one additional allocation to a particular  
3 license server if that particular license server did not have a sufficient number of allocations at

4 any time during processing of an update message received from at least one client computer  
5 operating in fail-over mode.

1 14. A system as recited in claim 13, wherein if the particular license server  
2 determines that it does not have a sufficient number of allocations at any time during the  
3 processing of an update message received from at least one client computer operating in fail-  
4 over mode, the current leader server is further programmed for:

5 looking for a source of available allocations by checking a count of available  
6 allocations in the leader server, a free pool, and any down license servers; and  
7 decreasing the count of available allocations from the source of available  
8 allocations and increasing the count of available allocations for the particular license server if  
9 the source of available allocations is found.

10 15. A system as recited in claim 14, wherein if no source of available allocations is  
11 found by checking the count of available allocations in the leader server, the free pool, and any  
12 down license servers, the current leader server is further programmed for:

13 looking for a source of available allocations by checking a count of available  
14 allocations in all functioning license servers not designated as the leader server; and  
15 decreasing the count of available allocations from the source of available  
16 allocations and increasing the count of available allocations for the particular license server if  
17 the source of available allocations is found.

1 16. A method for balancing a distribution of allocations for protected software over  
2 a communication network, the method comprising the steps of:

3 coupling a pool of license servers to the communication network;  
4 assigning a distribution of allocations to the pool;  
5 coupling at least one client computer to the communication network; and  
6 updating the distribution of allocations to add at least one additional allocation to  
7 a particular license server if that particular license server did not have a sufficient number of  
8 allocations in response to a request for authorization received from a client computer.

1           17.    A method as recited in claim 16, the step of updating the distribution of  
2 allocations further including the steps of:  
3                assigning a borrowing threshold to each license server; and  
4                determining whether the particular license server did not have a sufficient  
5 number of allocations by dividing an allocations-in-use value for that particular license server  
6 by a total allocations value for that particular license server and determining if a quotient of the  
7 division is greater than the borrowing threshold.

1           18.    A method as recited in claim 16, the step of updating the distribution of  
2 allocations further including the step of:  
3                selecting one of the license servers in the pool as a current leader server for  
4 storing the distribution of allocations for all license servers in the pool and for managing a re-  
5 assignment of allocations to give at least one additional allocation to a particular license server  
6 if that particular license server did not have a sufficient number of allocations at any time  
7 during processing of a request for authorization received from the client computer.

1           19.    A method as recited in claim 18, wherein when it is determined that the  
2 particular license server did not have a sufficient number of allocations during the processing  
3 of a request for authorization received from the client computer, the method further includes  
4 the steps of:  
5                looking for a source of available authorizations by checking a count of available  
6 authorizations in a free pool, any down license servers, and the current leader server; and  
7                decreasing the count of available allocations from the source of available  
8 allocations and increasing the count of available allocations for the particular license server if  
9 the source of available allocations is found.

1           20.    A method as recited in claim 19, further including the step of:

communicating the updated distribution of allocations in the pool to all  
functioning license servers in the pool that are not the current leader server through a  
distribution criteria sync message.

21. A method as recited in claim 18, further including the step of:  
updating the distribution of allocations by communicating a change distribution  
criteria message containing a new distribution of allocations to at least one license server.

22. A method as recited in claim 21, the step of updating the distribution of  
allocations by communicating a change distribution criteria message further including the steps  
of:

communicating the change distribution criteria message to the current leader  
server;  
updating the distribution of allocations in the pool in the current leader server;  
and  
communicating the updated distribution of allocations in the pool to all other  
functioning license servers in the pool that are not the current leader server through a  
distribution criteria sync message.

23. A method as recited in claim 18, further including the step of:  
adding allocations to the pool by communicating an add allocations message  
containing a count of allocations to be added to particular protected software to at least one  
license server.

24. A method as recited in claim 23, the step of adding allocations to the pool by  
communicating an add allocations message further including the steps of:  
communicating the add allocations message to the current leader server;  
updating the distribution of allocations in the pool in the current leader server;  
and

6 communicating the updated distribution of allocations in the pool to all other  
7 functioning license servers in the pool that are not the current leader server through a  
8 distribution criteria sync message.

1 25. A method as recited in claim 18, further including the step of:  
2 adding a new license code for protected software to the pool by communicating  
3 an add license code message containing a license code to be added to at least one license  
4 server.

1 26. A method as recited in claim 25, the step of adding a license code for protected  
2 software to the pool by communicating an add license code message further including the steps  
3 of:  
4 communicating the add license code message to the current leader server;  
5 updating a distribution table containing the stored license codes and  
6 corresponding distribution of allocations in the pool in the current leader server; and  
7 communicating the updated distribution table to all other functioning license  
8 servers in the pool that are not the current leader server through a distribution criteria sync  
9 message.

1 27. A method as recited in claim 18, further including the steps of:  
2 updating the distribution of allocations to add at least one additional allocation to  
3 a particular license server if that particular license server did not have a sufficient number of  
4 allocations during the processing of an update message received from at least one client  
5 computer operating in fail-over mode.

1        28. A method as recited in claim 27, wherein when it is determined that the  
2 particular license server did not have a sufficient number of allocations during the processing  
3 of an update message received from at least one client computer operating in fail-over mode,  
4 the method further includes the steps of:

5            looking for a source of available allocations by checking a count of available  
6 allocations in the current leader server, a free pool, and any down license servers; and

7            decreasing the count of available allocations from the source of available  
8 allocations and increasing the count of available allocations for the particular license server if  
9 the source of available allocations is found.

11        29. A method as recited in claim 28, wherein if no source of available allocations is  
12 found by checking the count of available allocations in the current leader server, the free pool,  
13 and any down license servers, the method further includes the steps of:

14            looking for a source of available allocations by checking a count of available  
15 allocations in all functioning license servers not designated as the current leader server; and

16            decreasing the count of available allocations from the source of available  
17 allocations and increasing the count of available allocations for the particular license server if  
18 the source of available allocations is found.

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